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(71) Applicant : **Cook Incorporated**
925 South Curry Pike P.O. Box 489
Bloomington Indiana 47402 (US)

(72) Inventor : **Anderson, Burton A.**
3501 Stafford Drive
Bloomington, Indiana 47401 (US)

(74) Representative : **Johnston, Kenneth Graham**
5 Mornington Road
Woodford Green Essex, IG8 OTU (GB)

(54) **Wire guide control handle.**

(57) A lockable wire guide control handle (10) for grasping and manipulating a wire guide (11). The control handle includes an elongated member (12) and a thumb slide (13) positioned in a retention channel (17) formed in the distal portion of the elongated member. The proximal portion (14) of the elongated member is cylindrical having an enclosed passageway (15) extending longitudinally therethrough, which is offset for passage of the wire guide therethrough. The distal portion of the elongated member includes a dovetail-shaped retention channel (17), the bottom surface including an inclined slot (19) for positioning the wire guide therein. The thumb slide includes a mating dovetail-shaped tenon positioned in the retention channel. Extending from the flat surface of the dovetail-shaped tenon is an inclined projection (41) for fixedly positioning the wire guide in the inclined slot. The inclined slot and projection have a variable, uniform spacing therebetween for fixedly positioning various diameter wire guides therein.

EP 0 534 747 A1

This invention relates to wire guide control handles having slideable members for locking wire guides of various diameters therein.

Wire guide control handles are used for grasping and manipulating wire guides during medical procedures commonly involving percutaneous access to the vascular system in which the wire guide is advanced and rotated through tortuous vessels.

U.S. Patent No.4,858,810 describes one form of control handle.

According to the present invention there is provided a control handle as defined in claim 1.

The embodiments serve to maximize the contact surface areas for fixdly positioning guides.

The retention channel is partially closed at the proximal end for preventing proximal removal of the slideable member. As a result, the slideable member is advantageously maintained in the retention channel without concern for separated pieces.

The enclosed passageway in the embodiments is preferably offset from the center longitudinal axis of the proximal portion as well as the inclined slot for easy and controlled rotation of the fixedly positioned wire guide when positioned in the vessel of a patient's vascular system. The offset position of the enclosed passageway with respect to the inclined slot also advantageously minimizes the possibility of kinking a fixedly positioned wire guide.

Brief description of the drawings.

FIG.1 depicts a wire guide control handle of an embodiment of the present invention;

FIG.2 depicts a partially sectioned side view of the handle of FIG.1;

FIG.3 depicts a top view of the handle of FIG.1;

FIG.4 depicts a cross-sectional view along the line 4-4 of FIG.3;

FIG.5 depicts a partially sectioned view of another embodiment of the invention;

FIG.6 depicts a partially sectioned view of a further embodiment of the invention; and

FIGS.7,8 and 9 are cross sectional views of further embodiments of the invention.

FIG.1 depicts a lockable wire guide control handle 10 for grasping and manipulating wire guide 11. The lockable control handle comprises an elongated member 12 including an inclined slot or channel 19 communicating with enclosed passageway 15 for positioning the wire guide therein and thumb slide 13 for locking or fixing the position of the wire guide in the inclined slot. Elongated member 12 includes proximal portion 14 with enclosed passageway 15 extending longitudinally therethrough. Distal portion 16 includes dovetail-shaped retention channel 17 extending longitudinally therethrough with inclined slot 19 extending longitudinally through flat bottom channel surface 18. Inclined slot 19 is angled distally away from the flat bottom channel surface for easy insertion of the wire guide. For further easing the insertion of the wire guide into the inclined slot, the distal end thereof includes internal taper 27. At the proximal end, the inclined slot is angled outwardly away from enclosed passageway 15 for fixedly positioning the wire guide in the slot without kinking the guide. Retention channel 17 also includes angled lateral surfaces 20 and 21 at a standard included angle of 60 degrees to form the well-known dovetail-shaped configuration.

Thumb slide 13 includes a mating dovetail-shaped tenon 22 extending laterally therealong and positioned in retention channel 17 for retaining the thumb slide in the channel. Stop 23 is positioned adjacent channel opening 24 and extends laterally from distal portion 16 for preventing thumb slide 13 from being extended beyond a predetermined forward position and out distal end 36 of the channel. Thumb slide 13 includes side catch 25 extending laterally from flexible member 26 for engaging the stop when the thumb slide is moved to a full forward position. The full forward position of the thumb slide is utilized for front loading wire guide 11 into inclined slot 19 and then enclosed passageway 15. Flexible member 26 flexes into relief channel 52 of the thumb slide for passage of the catch past the stop.

Distal portion 16 of the control handle also includes finger retention projections 28 and 29 extending radially therefrom and positioned longitudinally apart opposite retention channel opening 24. Finger projections 28 and 29 grip the physician's index finger for easily and controllably moving slide 13 with the physician's thumb between the full forward position and partially closed proximal end 30 of the retention channel. The finger retention projections are also utilized by the physician for moving the wire guide longitudinally in a vessel of the patient's vascular system. Proximal portion 14 is cylindrical for easily rotating the handle by the physician.

Depicted in FIG.2 is a partially sectioned side view of lockable wire guide control handle 10 of FIG.1 with thumb slide 13 fixedly positioning wire guide 11 in inclined slot 19 of retention channel 17.

Elongated member 12 basically comprises a 1.27cms x 1.62cms x 8.25cms (0.5" x 0.638" x 3.25") piece of commercially available LEXAN™ plastic material injection moulded, as shown. Thumb slide 13 comprises a 1.02cms x 0.93cms x 2.22cms (0.401" x 0.367" x 0.875") piece of CELCON™ plastic material also injection moulded, as shown. Elongated member 12 is approximately 8.25cms (3.25") in length with a maximum width of 1.27cms (0.5") about shoulders 31 and 32 of respective finger projections 28 and 29 as depicted in FIG.3. Flat top surface 33 of distal portion 16 is approximately 4.76cms (1.875") in length and has a variable width, as shown, with a maximum width of 1.27cms (0.5") about shoulders 31 and 32.

Surface 33 is recessed approximately 0.076cms (0.03") from outer surface 44 of cylindrical proximal portion 14. Channel opening 24 in flat surface 33 is approximately 0.36cms (0.142") in width and 4.6cms (1.813") in length for thumb slide 13 to slide between open distal end 36 and partially closed proximal end 30 of the retention channel.

Retention channel 17 is approximately 0.173cms (0.068") in depth with lateral surfaces 20 and 21 forming a standard 60 degree included angle to form the dovetail shape with flat bottom surface 18. Rounded bottom surface 43 of inclined slot 19 forms an angle of 2.5 degrees with flat bottom surface 18 and extends longitudinally therein to a maximum depth of approximately 0.216cms (0.085") about distal end 36. Internal taper 27 is a 30 degree taper extending into inclined slot 19 for approximately 0.19cms (0.075") from distal end 36. The proximal end of the inclined slot continues through flat bottom channel surface 18 and then into enclosed passageway 15. Inclined slot 19 is approximately 0.132cms (0.052") in width. Positioned on shoulder 31 adjacent channel opening 24 is elliptically shaped stop 23. The approximately 0.114cms (0.045") wide stop extends from flat surface 33 approximately 0.16cms (0.063"). The center of the rear semicircular surface of the stop is positioned approximately 1.84cms (0.725") from distal end 36 of the distal portion. The center of the front semicircular surface of the stop is approximately 0.178cms (0.07") forward. The stop is also positioned approximately 0.447cms (0.176") from the longitudinal center of the distal portion.

Distal portion 16 further includes finger retention projections 28 and 29, which are positioned longitudinally approximately 2.22cms (0.875") apart with projection 28 extending back from distal end 36 approximately 1.59cms (0.625"). Finger projections 28 and 29 include 0.635cms (0.25") radius curves 46-49 at the base thereof, which merge with outer cylindrical surface 45 of distal portion 16 having a 0.914cms (0.36") outside diameter. The finger retention projections are rounded at the tip thereof with a 0.79cms (0.312") radius, as shown by curved surface 39 in FIG.4.

Proximal portion 14 of the elongated member is cylindrical with an outside diameter of 0.81cms (0.32"). The proximal portion includes offset enclosed passageway 15 extending longitudinally therethrough and having a central longitudinal axis approximately 0.19cms (0.075") from outer cylindrical surface 44, as shown in FIG.2. Enclosed passageway 15 is offset from the center of the cylindrical proximal portion as well as inclined slot 19 for easily positioning the wire guide therethrough and torquing the fixedly positioned wire guide when in a patient's blood vessel. Enclosed passageway 15 has a diameter of approximately 0.18cms (0.071") with internal taper 37 forming an included angle of 60 degrees with an outside diameter of 0.3cms (0.12") about proximal end 38 of the proximal portion.

Thumb slide 13 is approximately 2.22cms (0.875") long, 0.76cms (0.3") high, and 0.726cms (0.286") wide with catch 25 extending approximately 0.2cms (0.081") laterally therefrom. Positioned about a proximal corner of the thumb slide is flexible member 26, which extends proximally approximately 0.95cms (0.375") in length. The flexible member is approximately 0.127cms (0.05") thick and has a height of 0.343cms (0.135") at the proximal end of the thumb slide. Positioned next to flexible member 26 is a 0.953cms (0.375") long by 0.19cms (0.075") wide relief channel 52, which allows for the lateral movement of the flexible member.

The proximal end of the thumb slide includes top curved thumb contact surface 51 having a radius of approximately 1.59cms (0.625"). Top distal end curved surface 40 of the thumb slide has a radius of approximately 0.478cms (0.188") for comfortable thumb slide movement by the physician. The thumb slide is pushed on elbows 34 and 35 sliding on flat top surface 33 to the full forward position to insert a wire guide into the inclined slot and enclosed passageway. When the guide is positioned in the slot and passageway, the thumb slide is pulled back to fixedly position or lock the guide in the inclined slot. The thumb slide extends approximately 0.762cms (0.3") above top surface 33 of the elongated member with dovetail tenon 22 extending 0.173cms (0.068") therefrom and into retention channel 17. Dovetail tenon 22 includes bottom tenon surface 50 and lateral surfaces 53 and 54 forming an included 60 degree angle. Flat bottom surface 50 is approximately 0.478cms (0.188") in width.

Approximately 0.19cms (0.075") from the distal end of the thumb slide, inclined projection 41 extends farmost for approximately 0.084cms (0.033"). Inclined projection 41 includes inclined bottom surface 42 which forms a 2.5 degree angle with respect to flat bottom tenon surface 50. The proximal and distal bottom ends of the thumb slide are chamfered at a 45 degree angle for approximately 0.127cms (0.05") and 0.19cms (0.075"), respectively, as shown. Inclined projection 41 extends from bottom surface 50 of the dovetail tenon and has a width of approximately 0.081cms (0.032") for insertion into inclined slot 19. Inclined surface 42 is substantially parallel to bottom surface 43 of the inclined slot. The parallel relationship of these two inclined surfaces allows for a variable, uniform width spacing bewteen the inclined projection and slot for accepting a variety of wire guide diameters. The parallel relationship of the inclined slot and projection also maximizes the contact surface area for grasping the wire guide without kinking or bending it.

The enclosed passageway can be at either end of the member 12 with the slideable member ar-

rangement at the respective other end. The passageway can be open if required.

In the preceding embodiments, the passageway has a longitudinally extending section 15 and an inclined section in which the slideable member 13 operates.

In the embodiments of FIGS.5 and 6 like references designate like parts in the other embodiments. The passageway 15 extends along the member 12 without an inclined section. In all embodiments the slideable member operates on a single planar wire guide surface, whether it is the inclined surface, or the single coplanar passageway surface of FIGS.5 and 6. In all of the embodiments, the base of the slideable member is parallel to the base of the respective passageway throughout the length of the passageway in which the slideable member operates.

In the preceding embodiments, the retention channel has a dovetail shaped mortice and the same form of arrangement can be employed in the embodiments of FIGS.5 and 6. The latter illustrates an alternative form of retention arrangement, and it is to be understood that that arrangement could alternatively be employed in the said preceding embodiments.

The handles of FIGS.5 and 6 each comprise a passageway 15 which is planar and extends longitudinally throughout the member 12. At the distal end in FIG.5 the slideable member 61 is slideably mounted for movement along an axis 62 inclined with respect to the lower surface of the wire guide support. The axis 62 is formed by a slot in a plate 63 on one side of the member 61 and a corresponding slot in another plate on the other side of the member 61. The plates can form side walls of member 12 if required. Two rods 64,65 fixed to the member 61 engage in the slots and guide the member 61 along the inclined axis. It will be appreciated that as the member 61 is moved along the inclined axis in either direction thereof, the bottom surface 66 will remain parallel to the wire guide support surface.

The member 61 is moved into a locking condition with respect to the wire guide by moving the member in a direction towards the proximal end 14 of the handle. When the surface 66 firmly engages the wire guide, the latter is locked to the handle.

The member 61 is moved into an unlocked condition by moving in a direction towards the distal end 16 of the handle. The surface 66 moves away from wire guide but still maintains the parallel relationship, whereby the wire guide can be moved along the handle to another position or a new wire guide can be longitudinally inserted into the handle without member 61 obstructing that process in any way.

In the embodiment of FIG.6 the slideable member 71 is mounted in a manner similar to that of member 61. One, 72, of two plates or sides of the member 12 is shown with an axial groove 73 inclined with respect to the wire guide support surface. Rods 74 and 75 extending from the sides of member 71 engage in the lateral grooves 73 and guide the member 71 along the inclined axis. The lower surface 77 of the member 71 remains parallel to the wire guide support surface, and thus the wire guide, at all positions of the member 71 along the axis 73.

In the FIG.6 embodiment, the member 71 is moved towards the distal end 16 to lock the wire guide, and is moved towards the proximal end 14 in order to release the wire guide.

In FIGS.5 and 6 the members 61 and 71 are shown to have an inclined upper surface. Clearly, the upper parts of these members can be any shape, such as rounded or square shaped. The axes 62 and 73 should, however, be inclined.

Depicted in FIG.7 is a partially cross-sectioned view of control handle 10 of FIG.5 taken along the line 7-7. Slide 61 is positioned in channel 17 and slideably moveable via rods 64 and 65 laterally positioned through the slide and into slots 56 and 62 in respective channel walls 57 and 63. Projection 68 extends from the bottom of the thumb slide and into slot 55, which has a bottom surface 67 that is coplanar with bottom surface 58 of passageway 15. As thumb slide 61 is moved longitudinally in channel 17, botton surface 69 of slide 61 as well as bottom surface 66 of projection 68 remain parallel to bottom channel surface 76 and wire guide support surface 67, respectively. The spacing between these surfaces varies as the slide is longitudinally moved in the channel; however, the surfaces remain parallel at all positions of the slide in the channel.

Depicted in FIG.8 is a partially cross-sectioned view of control handle 10 of FIG.6 taken along the line 8-8. Slide 71 is positioned in channel 17 with laterally extending rods 74 and 75 positioned in slots 59 and 73 in respective channel walls 60 and 72 laterally positioned on opposite sides of the channel. Bottom surface 77 of the slide remains substantially parallel to bottom wire guide support surface 78. The spacing between surfaces 77 and 78 is variable as the slide is moved longitudinally within the channel; however, the surfaces remain substantially parallel in all positions of the slide within the channel.

Depicted in FIG.9 is an enlarged, partial view of another embodiment of bottom channel surface 78 of the control handle of FIG.8. The bottom surface includes a V-shaped slot 70 for the positioning of a wire guide therein. This V-shaped slot minimizes the lateral movement of the wire guide when positioned therein.

Various alternative materials may be utilized to form the elongated member and thumb slide of the control handles. The control handles may alternatively be machined or formed utilizing other well-known techniques other than injection moulding. It is further contemplated that the shape of the mating retention channel and tenon may also be modified to some-

thing other than a dovetail configuration. The stop and catch may also be repositioned, but not to the ends of the inclined slot or enclosed passageway, which will deter easy loading of the wire guide. In summary, the offset enclosed passageway of the cylindrical proximal portion of the handle provides for rotation of a wire guide contained therein. In addition, the thumb slide normally pulled back to fixedly position the wire guide in the inclined slot may be utilized in combination with the finger retention projections to control longitudinal movement of the guide with a patient's vessel. The thumb slide may also be utilized to release and grasp the wire guide for feeding the wire guide into the patient's vessel. The handle is pulled back to remove the locked wire guide from the vessel.

Claims

1. A wire guide control handle comprising an elongated member (12) having a passageway (15) for the support and passage therethrough of a wire guide (11), and wire guide channel means (19) in communication with the enclosed passageway and also serving to support the wire guide therein, said handle also comprising a slideable member (13) having a surface (42) thereof slideably movable in the channel (19) of the channel support means (19) and serving to engage with or disengage from the wire guide when in the channel in order to lock or release the guide in the support means (19), and means (17,22) for causing the slideable member to slide along an axis inclined to the wire guide support surface (43) of the support means (19), characterised in that the said slideable member surface (42) extends only over one planar wire guide support surface and is substantially parallel to the said wire guide support surface (43) during all of the movement of the slideable member.

2. A handle according to claim 1, characterised in that the passageway (15) is enclosed at the proximal end, and in that the distal end of the passageway is channelled to receive and retain the slideable member, and to receive and position the wire guide on the wire guide support surface (43).

3. A handle according to claim 2, characterised in that a channel (19) is formed in a bottom surface of the channelled passageway, in that the wire guide is to be positioned within the said channel, and in that the said slideable member surface extends into the said channel (19) to contact the wire guide.

4. A handle according to claim 2 or 3, characterised in that the bottom surface of the said channel is inclined relative to the longitudinal axis of the elongated member, in that the axis of the slideable member is parallel to the said longitudinal axis, and in that the said slideable member surface (42) is inclined at substantially the same angle of inclination relative to the longitudinal axis as the said bottom surface (43).

5. A handle according to claim 2 or 3, characterised in that the bottom surface of the said channel is coplanar to the longitudinal axis of the elongated member, in that the axis (62) of the slideable member is inclined relative to the said longitudinal axis, and in that the said slideable member surface (66) is substantially parallel to the said bottom surface.

6. A handle according to claim 2 or any claim appendant thereto, characterised in that the slideable member is retained within the channel support means by a dovetail tenon (22) and mortice arrangement (20,21).

7. A handle according to any one preceding claim, further characterised by a stop (23) and catch (25) arrangement for retention of the slideable member.

8. A handle according to any one preceding claim, characterised in that the slideable member and the elongated member are shaped to facilitate movement of the slideable member to an engaging position.

9. A handle according to claim 4 or any claim appendant thereto, characterised in that the said passageway is offset relative to the inclined channel.

10. A handle according to claim 9, characterised in that the proximal end of the enclosed passageway includes an internal taper for receiving the wire guide.

11. A wire guide control handle comprising: an elongated member (12) having a passageway (15) extending longitudinally therein and a channel (19) communicating with said passageway for receiving a wire guide, said channel including a support surface (43) for supporting said wire guide; and a slide (13) positioned and slideable in said channel and having a surface (42) for engaging and fixedly positioning said wire guide in said channel, characterised in that said slide has a plurality of positions in said channel and is slideable in said channel such that said surface of said slide and said support surface of said channel are substantially parallel to one another and variably

spaced from one another at all of said positions of said slide in said channel.

12. The handle of claim 11, characterised in that said slide includes a projection extending therefrom and into said slot, said slot and said projection each having a surface such that said surface of said slot and said surface of said slide are substantially parallel to one another and variably spaced from one another at all of said positions of said slide in said channel.

13. A wire guide control handle comprising: an elongated member having a passageway extending longitudinally therein for receiving a wire guide, said passageway including a support surface for supporting said wire guide; and a slide positioned and slideable in said passageway and having a bottom surface for engaging and fixedly positioning said wire guide in said passageway, said slide having a plurality of positions in said passageway and being slideable in said passageway such that said bottom surface of said slide and said support surface of said passageway are substantially parallel to one another and variably spaced from one another at all of said positions of said slide in said passageway.

14. The handle of claim 11, or 13, characterised in that said bottom surface of said passageway includes a slot therein and extending longitudinally therethrough, or includes a V-shaped slot therein, or the passageway has a lateral surface with a slot therein inclined to the support surface of said passageway.

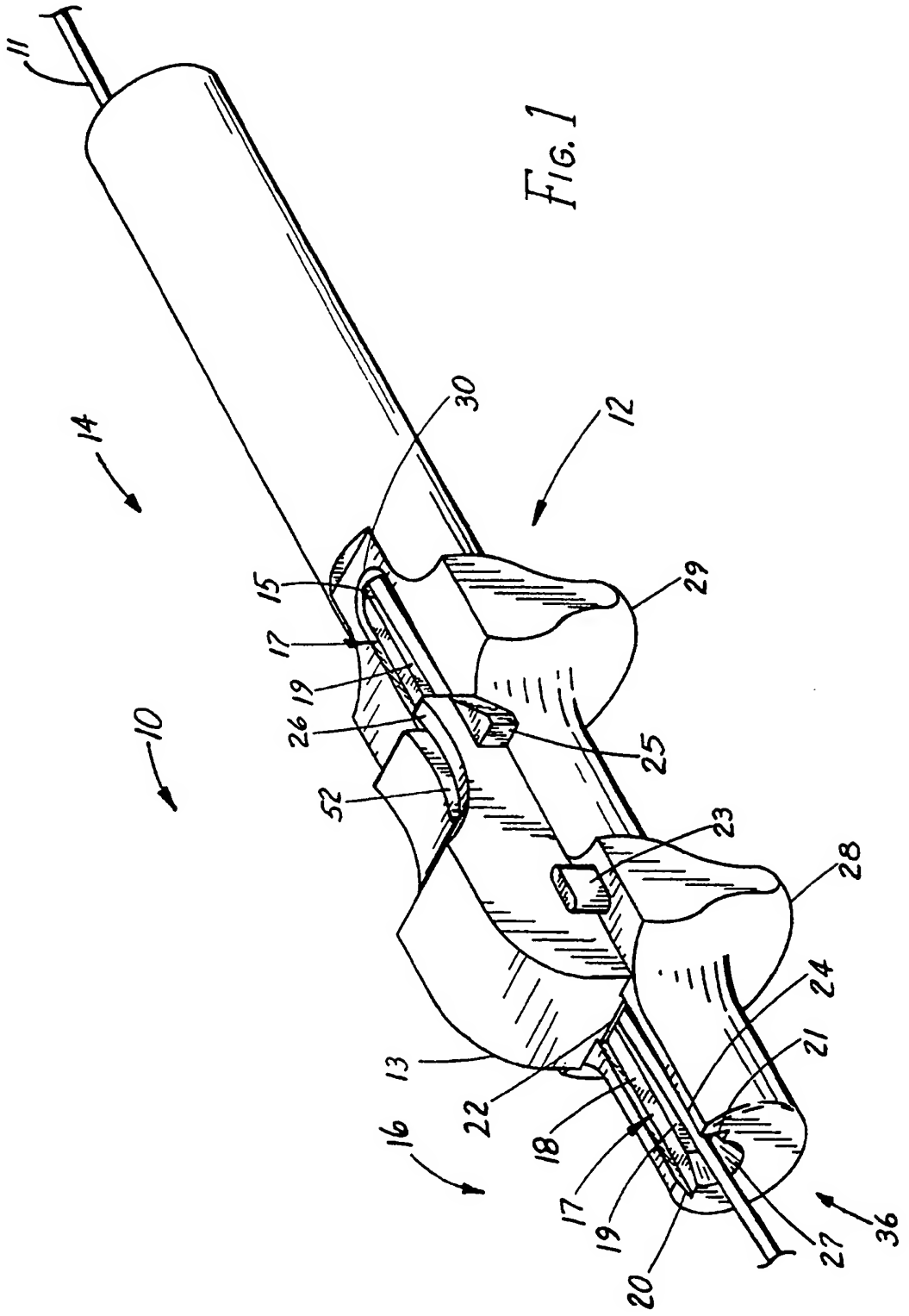
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FIG. 1

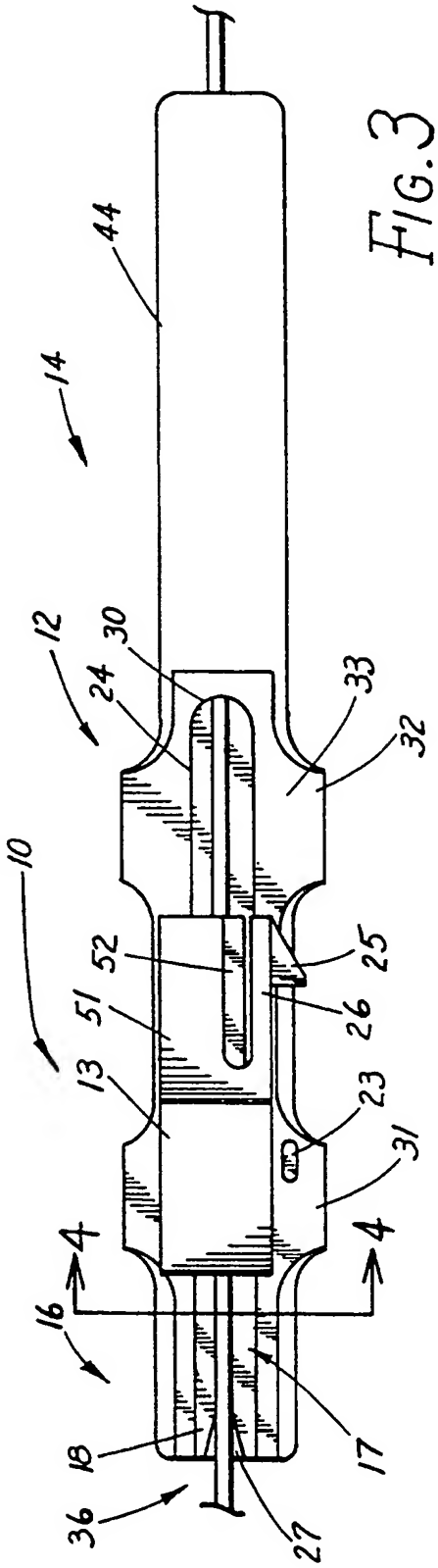
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FIG. 3

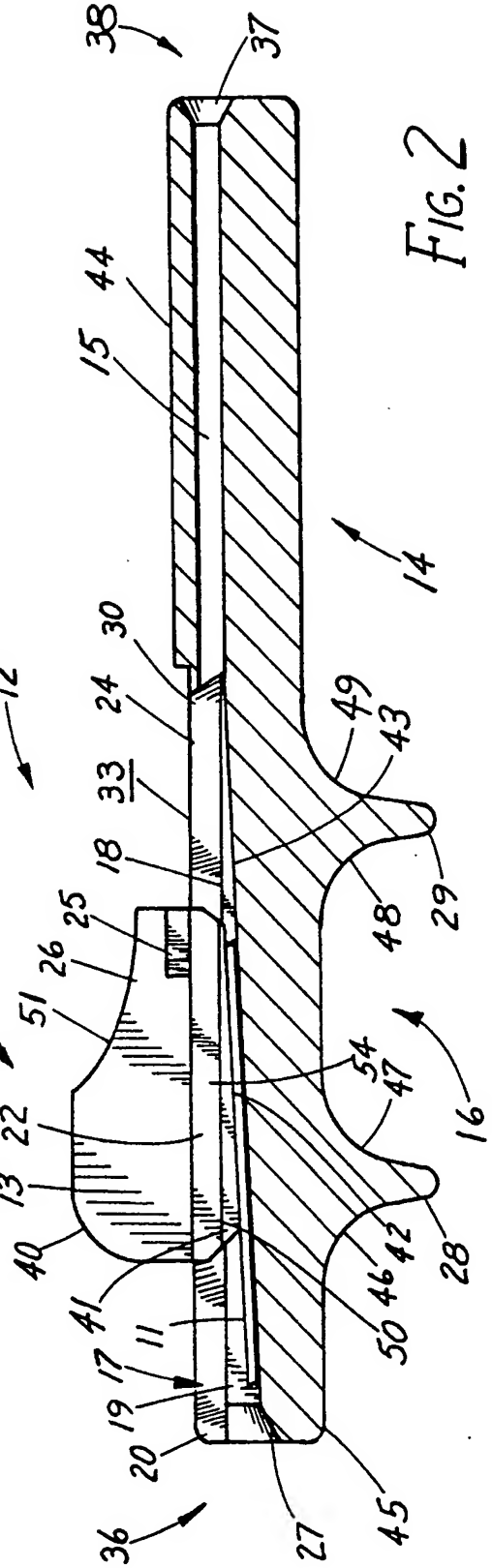
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FIG. 2

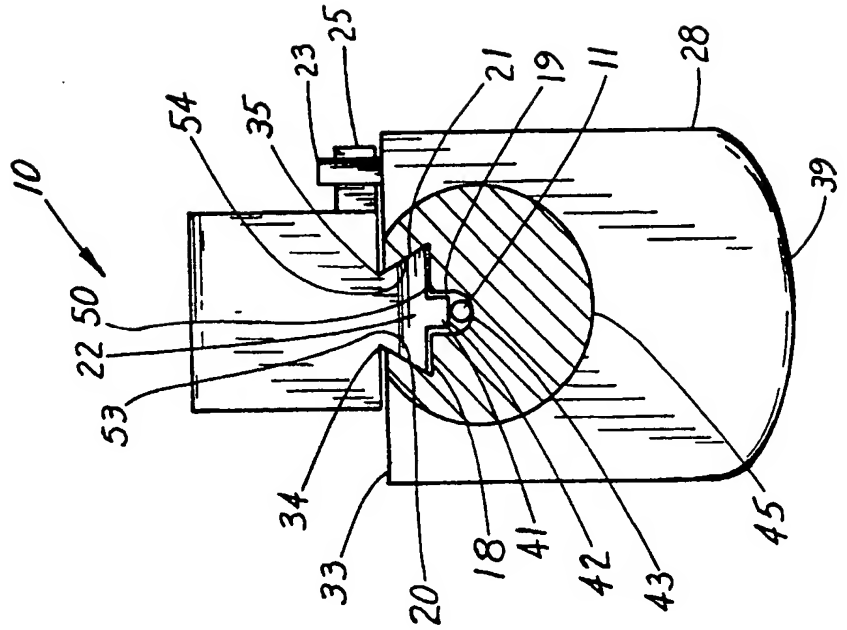

FIG. 4

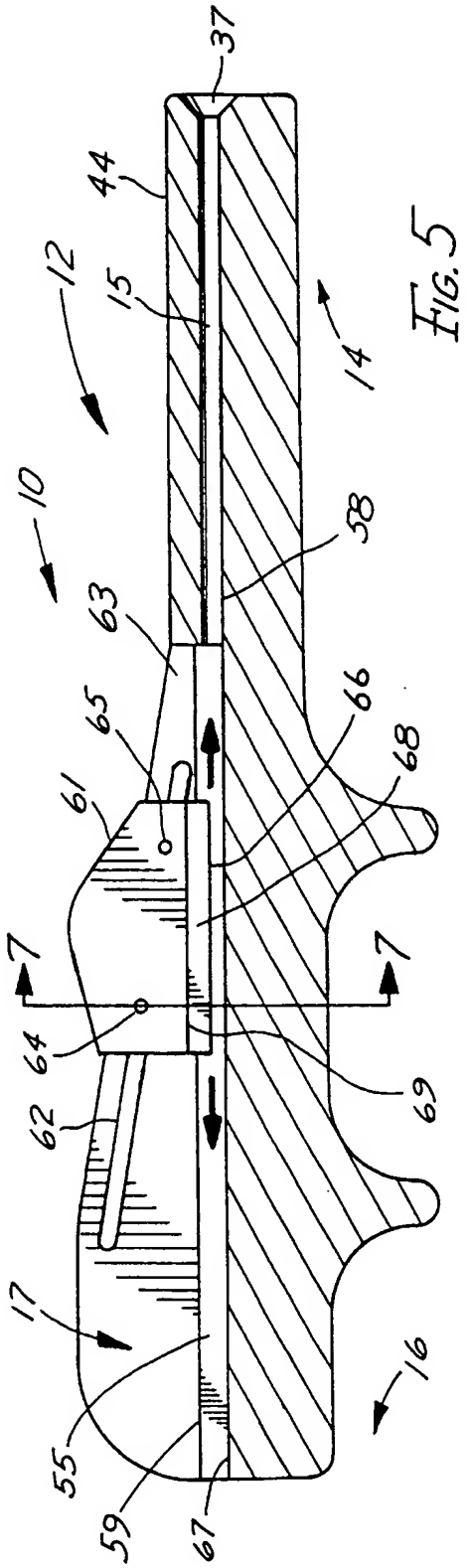
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FIG. 5

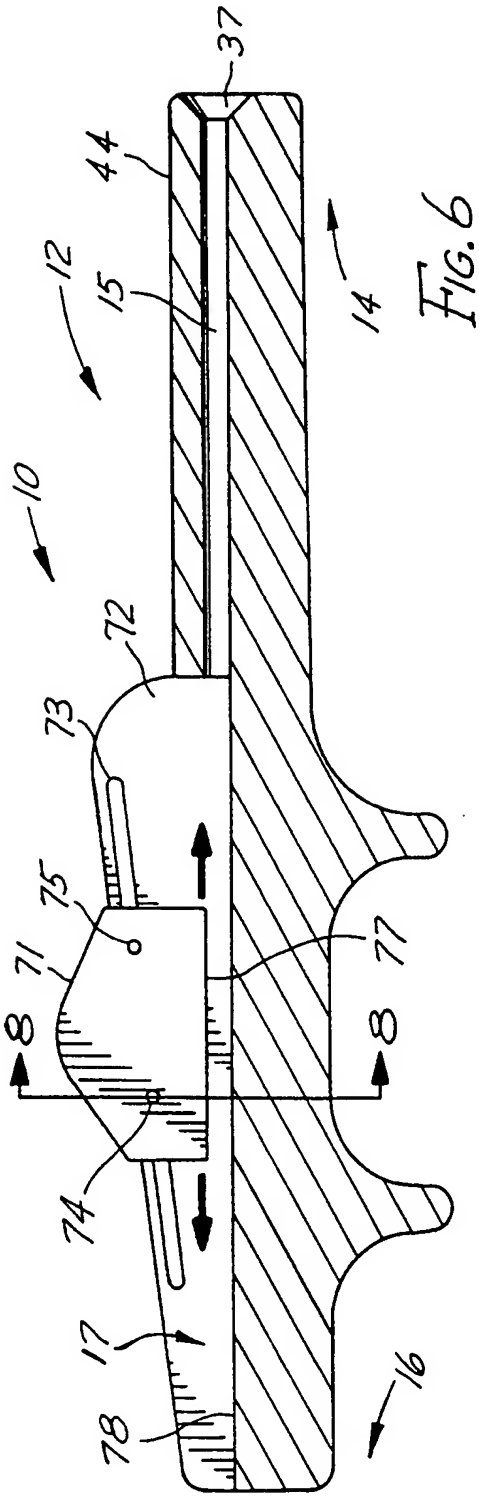
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FIG. 6

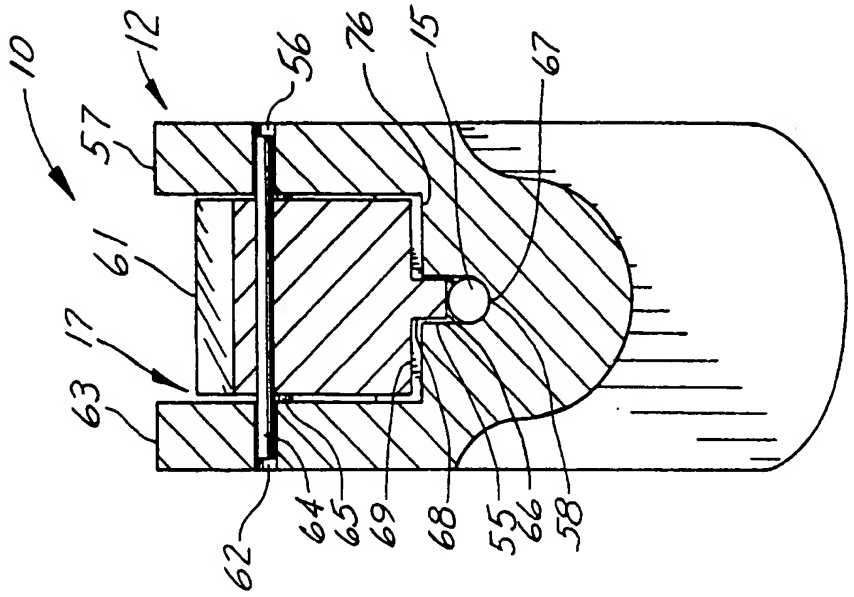

FIG. 7

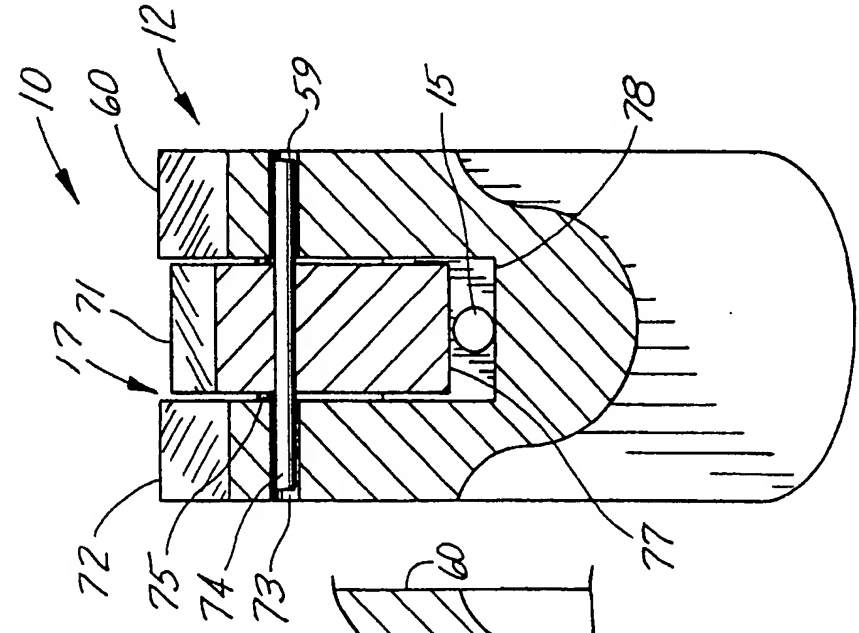

FIG. 8

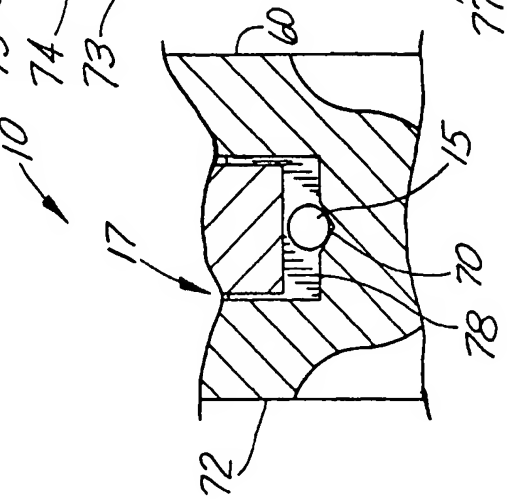

FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 30 8697

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,D	US-A-4 858 810 (INTLEKOFER ET AL.) * column 1, line 63 - column 2, line 55; figures 1-6 *	1-14	A61M25/01 A61B17/22
Y	US-A-1 442 862 (CURTIS) * page 1, line 50 - line 68; figures 1-4 *	1-14	
A	WO-A-9 004 994 (RAMSEY) * page 15, line 22 - page 17, line 18; figures 3-6 *	1,11,13	
A	US-A-4 860 742 (PARK ET AL.) * abstract; figure 2 *	1,11,13	
A	DE-C-507 177 (ZUTZ) * page 1, line 55 - line 64; figures 4-7 *	6	
A	EP-A-0 328 760 (BRAUN MELSUNGEN) * column 4, line 18 - line 27; figures 1,2 *	10	
A	DE-C-397 995 (KRELL) * figure 1 *	12	TECHNICAL FIELDS SEARCHED (Int. Cl.5) A61M A61B F16G
A	US-A-4 907 332 (CHRISTAIN ET AL.) * column 2, line 64 - line 66; figure 4 *	14	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 JANUARY 1993	MOERS R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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